

# Fleshy Fruits Eating Birds and Their Role in the Seed Dispersal of Plants in Maoer Mountain, NE China<sup>1</sup>

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**Abstract** There are 16 species of fleshy-fruit eating birds in Autumn in Maoer Mt. NE China. According to their feeding strategies, we can divide them into 3 groups: 1. Pulp-eating birds, they get nutrition from pulp, so, their seeds are defecated completely. These birds have a great effect on seed dispersal. 2. Seed-eating birds, they obtain nutrition from the seed but pulp. Seeds are digested totally. They don't disperse seeds at all. 3. Whole-fruit-eating birds, both seed and pulp are digested when passing through gut. They don't have any effect on seed dispersal either.

**Key Words:** Fleshy-fruit eating birds, Seed dispersal

## Introduction

Many plants have fleshy fruits in Autumn in temperate zone. These fruits provide food for many frugivorous birds. Birds get nutrition from the fruits, and disperse the seeds of these plants at the same time. Many researches on this topic are finished in Mediterranean Scrublands and American Cloud Forest<sup>[1,2]</sup>. But researches in this field are rare in China. Chang<sup>[3]</sup> reported the observation on feeding fleshy-fruit eating birds in cage. Pang<sup>[4]</sup> did some research on the relationship between Chinaberry and wild birds. Feng<sup>[5]</sup> and Ma<sup>[6]</sup> studied the food composition of some birds and mammals which feed fleshy fruits. Past studies didn't pay any attention to the seed dispersal. So we have studied frugivorous birds and their dispersing effect on fleshy-fruit-plants in Maoer Mt. from 1994 to 1996.

## Study Site

Maoer Mt. is located in Heilongjiang Province, NE China. This site is in temperate zone. Mean annual rainfall is 723.8 mm. Mean elevation is 300m. It is largely covered by second-growth broad-leaves forest. More than 250 species of birds and nearly 900 species

of seed plants live there. In Autumn, many fleshy fruits can be found, and most of them become the food of frugivorous birds. According to our survey from 1994 to 1996, we found at least 32 species of fleshy-fruit plants (Table 1). The most common plants are Cork Tree(*Phellodendron amurense*) and Hawthorn (*Malus baccata*). These two kinds of fruits are the main food of birds.

## Methods

We surveyed frugivorous birds species in field from September to November in the past 3 years. At the same time, we wrote down the bird's foraging behavior. We also caught some living birds, put them in cloth bag, and collected the excrement 1-2 hours later. Then we analyzed the excrement and tried to find what kinds of fruit the bird ate. During our field researching period, we banded a lot of frugivorous birds and wrote down these species' stay period.

## Foraging Types and Food Composition

All the 16 species of frugivorous birds can be divided into 3 groups based on their foraging types. They are pulp-eating birds, seed-eating birds and whole-fruit eating birds (Table 3). Different species have different

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diet in Autumn.

**Table 1. Fleshy-fruit plant in Maoer Mountain**

species	ripe fruit color
<b>Lorsythaceae</b>	
1 <i>Liscum coloratum</i>	red
<b>Berberidaceae</b>	
2 <i>Berberis amurensis</i>	red
<b>Menispermaceae</b>	
3 <i>Menispermum dauricum</i>	black
<b>Magnoliaceae</b>	
4 <i>Schisandra chinensis</i>	red
<b>Saxifragaceae</b>	
5 <i>Ribes</i> sp	red
<b>Rosaceae</b>	
6 <i>Crataegus pinnatifida</i>	red
7 <i>Malus baccata</i>	red
8 <i>Prinsepia sinensis</i>	red
9 <i>Prunus padus</i>	black
10 <i>Prunus maackii</i>	black
11 <i>Rosa davurica</i>	red
12 <i>Pyrus ussuriensis</i>	green
13 <i>Sorbus alnifolia</i>	red
14 <i>Sorbus polinashanensis</i>	red
<b>Rutaceae</b>	
15 <i>Phellodendron amurense</i>	black
<b>Celastraceae</b>	
16 <i>Euonymus sacrosancta</i>	red
<b>Rhamnaceae</b>	
17 <i>Rhamnus</i> sp	black
<b>Vitaceae</b>	
18 <i>Vitis amurensis</i>	black
<b>Actinidiaceae</b>	
19 <i>Actinidia</i> sp	green
<b>Araliaceae</b>	
20 <i>Acanthopanax senticosus</i>	black
21 <i>Aralia elata</i>	black
<b>Solanaceae</b>	
22 <i>Physalis alkekengi</i>	red
23 <i>Solanum nigrum</i>	black
<b>Rubiaceae</b>	
24 <i>Galium boreale</i>	black
<b>Caprifoliaceae</b>	
25 <i>Lonicera</i> sp.	red
26 <i>Viburnum sargentii</i>	red
27 <i>Viburnum burejaeticum</i>	black
<b>Liliaceae</b>	
28 <i>Asparagus schoberioides</i>	red
29 <i>Convallaria keiskei</i>	red
30 <i>Smilacina dahurica</i>	red
31 <i>Polygonatum</i> sp	black
32 <i>Paris verticillata</i>	black

Pulp-eating birds include 4 species of Thrushes (*Turdus* spp.), Azure-winged Magpie (*Cyanopica cy-*

*ana*), Jay (*Garrulus glandarius*), Red- Robin (*Tarsiger cyanurus*), Waxing (*Bombycilla garrulus*) and Grey-headed Woodpecker (*Picus canus*). These birds swallow the whole fruit when foraging, pulp of the fruit are digested, but the seeds are defecated completely. Because of their big flying range, they take the seeds to any place you can conceived and have an active effect on the seed dispersal.

## Results

### Birds composition

16 species of frugivorous birds in all are found in Maoer Mt. during Autumn based on our research (Table 2).

Number of Dusky Thrush (*Turdus naumanni*) is the largest. Red-flanked Bush Robin (*Tarsiger cyanurus*), Siberian Rosefinch (*Carpodacus roseus*) and White-browed Thrush (*Turdus obscurus*) are common species too.

**Table 2. Fleshy-fruit eating birds composition**

species	migrating situation	number class
<b>Phasianidae</b>		
1 <i>Bonasa bonasia</i>	R	+
<b>Picidae</b>		
2 <i>Picus canus</i>	R	+
3 <i>Picoides major</i>	R	+
4 <i>P. leucotos</i>	R	++
<b>Bombycillidae</b>		
5 <i>Bombycilla garrulus</i>	W	+
<b>Corvidae</b>		
6 <i>Garrulus glandarius</i>	R	++
7 <i>Cyanopica cyana</i>	R	+
<b>Turdidae</b>		
8 <i>Tarsiger cyanurus</i>	P	+++
9 <i>Turdus hortulorum</i>	S	++
10 <i>T. pallidus</i>	S	+
11 <i>T. obscurus</i>	S	+
12 <i>T. naumanni sinensis</i>	P	+++
<i>T. n. naumanni</i>	W	++
<b>Sittidae</b>		
13 <i>Sitta europaea</i>	R	++
<b>Fringillidae</b>		
14 <i>Carpodacus roseus</i>	W	+++
15 <i>Pyrrhula pyrrhula pyrrhula</i>	W	+
16 <i>Eophona personata</i>	W	+

R-Resident, S-Summer Visitor, P-Passenger, W-Winter Visitor

**Table 3. Foraging types of birds and their food composition**

foraging types	species	food composition													
		15	7	9	8	11	6	17	25	26	27	20	22	3	28
pulp-eating birds	7	+	+	+	+	+	+	+	+		+	+	+	+	+
	6		+	+									+		
	12	+	+												
	9	+	+						+						
	11		+												
	10		+												
	8		+				+								
	5	+	+						+						
seed-eating birds	2	+										+			
	13	+													
	14	+													
	15		+												
whole-fruit-eating birds	16		+												
	1	+													

\* The ordinal from table 2. \*\* The ordinal from Table 1

Dusky Thrush (*Turdus naumanni*) has the largest population among these species. In Maoer Mountain area, population size of this specie have fluctuated with the fruit yield over the past 3 years. In low yield year (1994), we could only find several tens of the birds one day. In high yield year, however, several hundreds of this specie could be found one day. Main food of the birds is fruits of Cork Tree and Hawthorn. Seed dispersal of them is finished largely by Dusky Thrush.

Seed-eating birds consist of Nuthatch (*Sitta europaea*), Siberian Rosefinch (*Carpodacus roseus*), Bullfinch (*Pyrrhula pyrrhula*) and Masked Hawfinch (*Eophona personata*). This group of birds cut the fruit and eat the seeds only, pulp of the fruit are remained. They get nutrition from embryo and endosperm of the seed. This kind of foraging behavior hasn't any beneficial effect on the seed dispersal of seed plant.

Whole-fruit eating bird only has one specie: Hazel Grouse (*Bonasa bonasia*). Hawthorn is the favorable food of the bird. Both pulp and seed are digested. No seeds are found in the excrement.

## Discussion

In Autumn, ripe fleshy fruits of plants in temperate zone become red or black. Many frugivorous birds are

attracted to feed them. These birds can be divided into 3 groups based on their foraging behavior. Pulp-eating birds are seed dispersers. Seed-eating birds and whole-fruit-eating birds are seed predators. Most species of frugivorous birds belong to seed dispersers in Maoer Mountain.

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